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Patent Claims

1. A piezoelectric drive unit for generating a preferably rotating drive movement comprising:
a stator (1), a rotor (2; 5;7) rotatable about a rotational axis (11) with respect to the stator, and drive elements preferably taking the form of several piezoelectric actuators (8),
characterized by
an annular gap (4') filled with a fluid medium (10) that is formed between the facing surfaces of the stator (1) and the rotor (2; 5;7),
several piezoelectric actuators (8a-8f) arranged adjacent to the gap which, on electrical activation according to a predetermined scheme or a predetermined function, undergo an essentially radial change in length in the direction of the gap (4'), such that the mechanical energy provided by the actuators is transmitted to the fluid medium as flow energy, wherein the flow energy of the fluid medium is transmitted to the rotor and transformed into a rotating drive movement of the rotor (2; 5;7).

2. A piezoelectric drive unit according to claim 1, **characterized in that** the piezoelectric actuators (8a-8f) are disposed along the circumference of the gap (4').

3. A piezoelectric drive unit according to one of the preceding claims, **characterized in that** the stator (19) has a collar (20) that acts as a resonator and forms the outer limit of the gap, wherein a piezoceramic ring (21;22;23;24) that comprises several piezoelectric actuators (16;26;27;28) is arranged at the outside circumference of the collar (20).

4. A piezoelectric drive unit according to one of the preceding claims, **characterized in that** the piezoelectric actuators (8a-8f) are disposed on one plane.

5. A piezoelectric drive unit according to one of the preceding claims, **characterized in that** the piezoelectric actuators (8a-8f) are segmented in form.

6. A piezoelectric drive unit according to one of the preceding claims, **characterized in that** a part (5) of the rotor has rib-shaped projections (12) distributed over its circumference which face the gap (4') and are circulated with the fluid medium.

7. A piezoelectric drive unit according to one of the preceding claims, **characterized in that** the rotor (2;5;7) is supported in the stator using a hydrodynamic bearing system.

8. A piezoelectric drive unit according to one of the preceding claims, **characterized in that** the gap (4') forms part of the gap (4) of the hydrodynamic bearing system.

9. A piezoelectric drive unit according to one of the preceding claims, **characterized in that** it is designed as a spindle motor.

10. A piezoelectric drive unit according to one of the preceding claims, **characterized in that** it forms a part of a hard disk drive.

11. A method for generating a preferably rotating drive movement for a drive unit comprising a stator (1) and a rotor (2;5;7), wherein several piezoelectric actuators (8) are preferably used as drive elements,
characterized in that
the mechanical energy provided by the piezoelectric actuators (8a-8f) is transformed into flow energy (hydrodynamic energy) for a fluid medium (10), and the flow energy of the fluid medium is transmitted to the rotor and transformed into a rotating drive movement of the rotor (2;5;7).

12. A method according to claim 11, **characterized in that** the fluid medium is accommodated in a substantially annular gap (4'), wherein the piezoelectric actuators (8a-8f) are arranged and activated such that they generate a defined, directed flow of the fluid medium within the gap (4') and the rotor is set into rotation by the flow.

13. A method according to one of the claims 11 or 12, **characterized in that** the actuators (16;26;27;28) act on an annular resonator (20) and excite it to vibration such that a traveling wave is formed whose mechanical energy is transmitted as flow energy to the fluid medium found in the gap.

14. A method according to one of the claims 11 to 13, **characterized in that** the flow in the gap (4') is directed transversely to the rotational axis (11) of the drive unit.

15. A method according to one of the claims 11 to 14, **characterized in that** the piezoelectric actuators (8a-8f) are electrically activated according to a predetermined scheme or a predetermined function.

16. A method according to one of the claims 11 to 15, **characterized in that** the piezoelectric actuators (8a+8d, 8b+8e, 8c+8f) located opposite each other with respect to the rotational axis (11) are driven in pairs.